

Perceived time pressure and social processes in project teams

Stefan Nordqvist ^a, Svante Hovmark ^{a,*}, Annika Zika-Viktorsson ^b

^a Department of Psychology, Stockholm University, S-10691 Stockholm, Sweden

^b Department of Machine Design, Royal Institute of Technology, S-10044 Stockholm, Sweden

Received 5 July 2002; received in revised form 10 September 2002; accepted 18 November 2003

Abstract

This study addresses the issue of perceived time pressure in project teams. The first purpose was to investigate how time pressure relates to job satisfaction and estimated goal achievement. A second purpose was to investigate how team processes [team support for the goal, cooperation and collective ability] affect the potential effect of time pressure. The study includes members [$n = 110$] of 12 projects [six construction projects, five product development projects and one organizational development project] from four Swedish companies. Data was collected by means of a questionnaire and the response rate was 76%. Time pressure was negatively related, although slightly, to both estimated goal fulfillment and job satisfaction. The negative effect of time pressure was moderated by team support for the goal and collective ability in such a way that the negative effect disappeared. The findings remained after controlling for task complexity.

© 2003 Elsevier Ltd and IPMA. All rights reserved.

Keywords: Time pressure; Project work; Team processes

1. Introduction

In engineering companies today, project teams are recognized as being important for the effective management of non-routine and time-limited tasks that demand parallel activities and cooperation between competencies. How project teams are to be managed in order to achieve functional team-cooperation and stimulating work situations, and get the work done according to goals and plans are important questions within the field of project management.

Project work can generally be defined as work that is aimed at accomplishing a given and, to some degree, unique task. The work is limited in time and involves the coordinated undertakings of interrelated activities (see e.g. [1,2]). Goal-focus and time-limitation, as well as cooperation between colleagues from different areas of expertise or functions are characteristics of a project.

Time-related issues are central in project management and project work. Completion by schedule due date is

one of the most frequently used measurements of project success [3]. Deadlines and time resources are important regulators for how work is planned and practiced. Time pressure is a more or less continuous and obvious feature of project work. In spite of this, little empirical research has been conducted in industrial organizations on the time-related aspects of both project work and effectiveness.

In the study presented in this article, an examination is made of how perceived time pressure, team support for the goal, cooperation and perceived ability within teams influence job satisfaction and goal fulfillment. Goal fulfillment is, in this case, measured by allowing the coworkers to estimate if they had achieved the stipulated goals for product quality in adherence with time-schedules and budget.

1.1. Time pressure and team processes

Deadlines regulate and help to structure the work through the breakdown of projects into interim goals, different courses of action, and time anchoring. Activities and tasks are given a certain time frame, and the existence of a deadline motivates the project team to

* Corresponding author. Tel.: +46-8-16-39-43; fax: +46-8-15-96-42/93-42.

E-mail address: shk@psychology.su.se (S. Hovmark).

start working on the task [4]. The motivation intensifies as the deadline approaches and the teams increase their activity when they feel the time pressure because of a forthcoming deadline [5–7]. Absence of time pressure can lead to attention straying to activities outside the project, or to indifference [8].

High levels of time pressure can engender a loss of enthusiasm and an inability to act [9]. High levels of time pressure produce stress, which can in turn lead to passivity, and avoidance may occur [10]. This can have a negative effect on members' health and performance [11–13]. Project members' perception of the team's capacity to achieve its objectives influences how time pressure is experienced [8]. Whether members of a project team perceive the time available for a task as sufficient will in part depend on the climate and processes within the team.

Previous research emphasizes the importance of having a clear direction that specifies a team's purpose and orientates it toward its objectives [14,15]. A well-formulated and established goal enhances motivation and improves effectiveness [16]. How clearly the project goal can be spelled out partly depends on its complexity [17]. Project work often encompasses conflicting interests or demands from different functional areas. It is vital for any project that members share a vision of its objectives and work towards a common goal. Acceptance of and commitment to the goals are enhanced by participating in goal setting [18]. A clear and established goal may increase motivation and satisfaction, and facilitate cooperation within a team [19]. A clearly defined goal may also be expected to reduce the experience of negative time pressure in a project team because it both promotes the ability to control and direct actions for goal achievement and breaks down the work into sub-goals for which specific tasks are determined.

There is an interdependency between the members of a project team. It is the team's responsibility to ensure that the variety of perspectives on the problem to be solved are discussed and finally integrated into the solution. Members interact and cooperate in order to accomplish the work and complete the project on-time. Cooperation and interaction among team members promote emotional ties, which, in turn, have a positive impact on effectiveness and job satisfaction [20] and prevent social loafing or free riding [21]. Cooperation can also be expected to reduce members' experience of time pressure by promoting supportive behavior within the team, i.e. the degree to which project members share the workload. Cooperation engenders feelings of belonging and social support [22], which moderate negative stress reactions. For example, stressors such as time pressure cause less strain when coworkers have access to social support [23].

Teams can differ in their belief in their own effectiveness and capability to achieve stated objectives [19].

Potency is the collective conviction among members that the group can be effective in their undertakings [24]. It refers to the idea about overall effectiveness across the multiple tasks encountered by teams at work. Groups with high potency are more committed and willing to work hard for the team [19]. Potency has been shown to impact both effectiveness, in terms of productivity, and work satisfaction in a positive direction [8,25]. According to Gevers, Van Eerde and Rutte [8], teams with low potency can be expected to perceive high levels of time pressure. That is, members of such teams are likely to procrastinate in order to avoid an unpleasant or threatening task.

The term collective ability is used instead of potency, in this study, because potency refers to the shared belief within a team that it can be effective [24]. This study is conducted on an individual level and it is therefore relevant to refer to an individual's belief that the team can perform successfully.

1.2. *The present study*

The first purpose of this study was to investigate whether and how time pressure influences goal achievement and job satisfaction. Team effectiveness is, in this study, considered to be a question of both project productivity and members' satisfaction. Efficient teams are not only highly productive but also allow their members greater satisfaction [26,27]. All projects included in this study were in progress and it was not possible to gain more objective measures of project performance. Individual members, consequently, estimated the achievement of project goals at the time of the study.

A second purpose was to investigate whether and how team processes (support for the goal, cooperation and collective ability) affect the potential effect of time pressure.

The complexity of the task may differ from one project to another and team processes may vary with task complexity. For instance, more complex tasks require more cooperation and coordination of subtasks among members [28]. A complex task often entails a greater number of activities in the project, and as the number of activities increases, delays become more common [3]. The third purpose of the study was to examine whether prior effects remain when task complexity has been controlled for.

2. Method

2.1. *Setting*

The study includes members of 12 projects at four Swedish companies. Six of the projects were construction projects, five were product development projects

and one was an organizational development project. Three projects from each company were selected in consultation with a company manager. The criteria were that the project should consist of interdependent activities demanding multifunctional collaboration and that the project should have a time schedule of more than one year. Furthermore, because workload and time pressure fluctuate between project phases [29], it was decided that the projects should have reached the half-way stage and be at least at the beginning of the implementation phase, in which materials and resources are transformed into the intended project goal and the actual work of the project is performed.

All projects were what Turner and Cochrane [17] call type-2 projects: projects for which the goals are defined but the methods are not, and that were organized in a matrix form overlaid on the functional departments of the company. Responsibility for integrating different disciplines and specialties in the operational process was allocated to the multifunctional project teams. The project manager was responsible for planning and administering the project, and for reporting to senior managers, stakeholders and clients.

The construction projects designed and delivered plant and machinery for industrial processes in the medical and pulp industries. The product development projects took place in two engineering companies. Two of these projects were developing new products, and three of them were undertaking radical redesigns of existing products. The aim of the organizational development project was to change the company's environment policy, e.g. emissions, health and safety questions.

The time span of the projects varied between two and seven years ($M = 3.3$, $SD = 1.5$), and, on average, five functions were involved in the projects. At the time of the study, the team sizes ranged from 7 to 22 members ($M = 14$, $SD = 5$).

Data was collected by means of a questionnaire, which the project manager distributed to the members of their teams. A cover letter explained the general purpose of the research and assured the confidentiality of the responses. The respondents answered the questionnaire individually and returned them to the research team in pre-paid, self-addressed envelopes. The response rate was 76%.

2.2. Participants

The study group is comprised of 110 project members. The respondents were quite familiar with project work ($M = 3.42$, $SD = 0.99$, where 1 indicates no prior experience and 5 very high experience). They had worked in their own professions for between 1 and 40 years ($M = 14$, $SD = 10$) and in their organization for between 1 and 35 years ($M = 12$, $SD = 9$). Overall these members dedicated 54% of their time to the project in

question. Men comprised 94% of the sample and 43% had a university degree. The age of the respondents ranged from 24 to 62 years ($M = 41$, $SD = 10$).

2.3. Measures

Responses on the study variables were obtained on a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

Time pressure was measured with three items from Hovmark and Thomsson [30]. Respondents were asked if they felt they had too many work tasks for the time available (e.g. "Do you have so much to do in the project that it has a negative impact on your chances to carry out your work effectively?").

To measure *team support for the goal* and *team co-operation*, questions were formulated specifically for this study. Team support for the goal was reflected by questions about members' shared vision and acceptance of the objectives for the project and was measured by three items (e.g. "All members' of the project work together towards a shared goal"). Co-operation was measured by four items and mirrors the support and help available within the team (e.g. "In this project members step in and help each other when needed.").

Collective ability represents an individual member's trust and belief in the team and its way of working. Items from Campion, Medsker and Higgs [25] were used, although adapted and modified for the purpose of this study. Collective ability was measured with four items (e.g. "My project team can take on almost any task and get it done successfully").

The variable *task complexity* was created for this study and consists of four items. It represents the complexity of the task in terms of challenge, problem solving, creativity and imaginative thinking (e.g. "This project demands a lot of creative problem-solving").

Job satisfaction was measured by a three-item scale from Hellgren et al. [31], which reflects employees' general satisfaction with their jobs. The formulation of the questions was slightly modified to fit the purpose of the study (e.g. "I am satisfied with my job in the project").

Estimated goal fulfillment was measured by six items constructed for this study. Respondents were asked if their teams, at the time of the study, had accomplished their objectives and achieved subgoals, concerning quality, time and budgets, and if general standards for efficient work were fulfilled (e.g. "Has the project accomplished its goals so far?" and "Has the project been carried out effectively so far?").

2.4. Data analysis

Factor analysis was used for data reduction of variables formulated for this study (team support for the goal, cooperation, task complexity and goal fulfillment).

Table 1
Descriptive statistics and correlations between study variables

Variable		Number of items	1	2	3	4	5	6	7	M	SD	α
1	Time pressure	3	1							2.96	0.75	0.74
2	Team support for the goal	5	−0.19*	1						3.62	0.81	0.86
3	Team cooperation	4	−0.22*	0.55**	1					3.24	0.73	0.87
4	Collective ability	4	−0.10	0.53**	0.50**	1				3.25	0.60	0.70
5	Job satisfaction	3	−0.18*	0.56**	0.37**	0.45**	1			3.89	0.81	0.88
6	Estimated goal fulfillment	6	−0.21*	0.58**	0.46**	0.47**	0.26**	1		3.47	0.62	0.83
7	Task complexity	4	0.02	0.32**	0.04	0.12	0.25**	0.26**	1	3.87	0.72	0.70

Scale range 1–5 and $n = 110$.

* $p < 0.05$.

** $p < 0.01$.

All factor loadings had magnitudes larger than 0.59. Reliability was estimated by using Cronbach's alpha. All variables were, approximately, normally distributed around their means. The alpha coefficient for all included variables are reported in Table 1. Hierarchical regression analyses were used to address the research questions.

3. Results

Mean values, standard deviations, reliability coefficients, and the correlations between all variables are shown in Table 1. The table also shows that estimated goal fulfillment and job satisfaction are significantly related to the other variables. The alpha estimate was acceptable for all variables included. The relatively high mean value for complexity indicates that the task was seen as challenging and demanded a great deal of problem solving. The mean values for both estimated goal fulfillment and job satisfaction imply that the respondents tended to agree that the projects were reasonably effective.

In order to investigate the effects of time pressure, team support for the goal, cooperation, collective ability and task complexity on job satisfaction and estimated goal fulfillment, two hierarchical regression analyses were conducted, as shown in Table 2. In the first step, time pressure was entered in order to estimate the effect of this variable alone. In the second step, team support for the goal, cooperation and collective ability were entered in order to investigate whether these variables affect the relationship between time pressure and the outcomes variables. The control variable of task complexity was entered in the third step.

The results from the regression analysis show that job satisfaction was negatively predicted, although only slightly, by time pressure. When team support for the goal, cooperation and team confidence were entered into the analysis in the next step, there was a sharp increase in explained variance. Team support for the goal and collective ability emerged as significant predictors, while the previous effect of time pressure disappeared. Team cooperation failed to reach significance. Task complexity, entered in step 3, had no significant relationship to job satisfaction, while team support for the goal and

Table 2
Summary of hierarchical multiple regression analyses for dependent variables job satisfaction and goal fulfillment

Predictor	Job satisfaction			Estimated goal fulfillment		
	1	2	3	1	2	3
Step 1						
Time pressure	−0.18*	−0.07	−0.09	−0.21*	−0.08	−0.07
Step 2						
Team support for the goal		0.41***	0.36***		0.42***	0.44***
Team cooperation		0.03	0.05		0.12	0.11
Collective ability		0.20*	0.19*		0.19*	0.19*
Step 3						
Task complexity			0.12			0.05
R^2 [adjusted]	0.03*	0.32***	0.33***	0.04*	0.40***	0.40***
ΔR^2	0.03*	0.29***	0.01	0.04*	0.36***	0.00

$n = 110$.

R^2 = explained variance, ΔR^2 = additional contribution to explained variance.

* $p < 0.05$.

*** $p < 0.001$.

collective ability remained significant. Altogether, the variables accounted for 33% of the variance in job satisfaction.

The regression analysis for the variable of estimated goal fulfillment followed a similar pattern. Time pressure, entered in the first step, had a weak negative relationship with estimated goal fulfillment. This relationship vanished in step 2 when team support for the goal, cooperation and collective ability were entered, and the variance explained increased dramatically. Team support for the goal and collective ability emerged as significant predictors for estimated goal fulfillment, while the relationship of team cooperation, once again, was not significant. In the third step, when task complexity was entered, the effects of team support for the goal and collective ability remained significant while task complexity was non-significant. Overall, the variables in the model explained 40% of the variance in estimated goal fulfillment.

The results of this study indicate that time pressure in itself has a slightly negative influence on job satisfaction and estimated goal fulfillment. However, when group processes such as team support for the goal and collective ability are high, the results of the study imply that the negative impact of time pressure will decrease or disappear. The variables of team support for the goal and collective ability were both clearly associated with job satisfaction and estimated goal fulfillment. In the model used in this study, when team cooperation was put into the analysis, together with team support for the goal and collective ability, team cooperation did not show any significant relationship with outcome variables.

The variable of task complexity had no significant impact on the results in the analyses carried out, which means that the results described above are not influenced by the task's degree of complexity. Of the variables studied, team support for the goal and collective ability had a considerable influence on the outcome variables of job satisfaction and estimated goal fulfillment, which is indicated by the share in explained variance, 33% respectively 40%.

4. Discussion

As predicted, time pressure was negatively related, albeit slightly, to both estimated goal fulfillment and job satisfaction. This means that members who perceived a high degree of time pressure were less satisfied and felt that set goals were less often attained. The result shows no association between the individual's perception of time pressure and the level of task complexity. Examining the relationship between deadlines and effectiveness, Tukel and Rom [3] demonstrated that when project managers decide the deadline, completion on due date becomes the primary criterion for measuring

project success. It is reasonable to assume that if on-time completion is the number one measurement of success, this can increase the work pace and time pressure, irrespective of the level of task complexity. The project might meet the completion deadline, although the end result might not be acceptable to the client because of, for example, omission of quality.

This study indicates how team support for the goal and collective ability can moderate negative effects of time pressure. When the project goal and tasks involved are discussed and communicated within the team, individual members are able to understand what they are expected to do and what has to be achieved. Such knowledge creates the ability to structure the work and prioritize activities. A backlog, and thus rising time pressure, does not discourage team members. The high collective ability enables them to remain unaffected by high time pressure. They are convinced that they will be able to manage delays and complete the project on time. This is in accordance with Gevers, Van Eerde and Rutte's [8] notion that low potency teams are dispirited by high levels of time pressure, which causes them to procrastinate, resulting in limited effectiveness. This study shows the importance of well-designed and proper team processes for the functioning of effective groups.

It can be concluded that the experiencing of collective ability and competence, together with team support for the goal, makes teams better able to cope with increased time pressure.

In generalizing the results, some limitations should be addressed. The results are based on self-reported measures. It is difficult to determine the extent to which, for instance, reports of goal achievement reflect actual circumstances. The study could have been able to show more dependable results if an external assessment of goal achievement or productivity had been carried out. However, this was impossible because the projects had to be in progress to reflect members' perception of time pressure. The small sample size and the cross-sectional research design also limit the possibility to make conclusions. High internal correlations between predictors are a common problem in research of teamwork [32]. In this study the reliability scores give some credence to the data, and the study has tried to distinguish different team process predictors.

Despite these limitations, this study has contributed to our understanding of the influence of time pressure on project work, as it demonstrates that social interaction processes can moderate the negative effect of time pressure. These findings should be followed up. Future research may examine whether and how different methods of planning affect time pressure or perhaps endeavor to investigate the effects of time pressure during the different phases of project life. How projects are managed, administrated and planned may play a role in the creation of time pressure [3].

Acknowledgements

This study was supported by a grant from the Swedish Council for Work Life Research.

References

- [1] Packendorff J. Inquiring into the temporary organization: new directions for management research. *Scand J Manage* 1995;11(4):319–34.
- [2] Meredith J, Mantel S. *Project management: a managerial approach*. New York: Wiley; 1995.
- [3] Tukul OI, Rom WO. Analysis of the characteristics of projects in diverse industries. *J Oper Manage* 1998;16(1):43–61.
- [4] McGrath JE, O'Connor KM. Temporal issues in work groups. In: West MA, editor. *Handbook of work group psychology*. Chichester: Wiley; 1996. p. 25–52.
- [5] Seers A, Woodruff S. Temporal pacing in task forces: Group development or deadline pressure? *J Manage* 1997;23(2):169–87.
- [6] Gersick C. Time and transition in work teams: toward a model of group development. *Acad Manage J* 1988;31(1):9–41.
- [7] Ancona DG. Outward bound: Strategies for team survival in an organization. *Acad Manage J* 1990;33(2):334–65.
- [8] Gevers J, Van Eerde W, Rutte CG. Time pressure, potency and progress in project groups. *Eur J Work Organizat Psychol* 2001;10(2):205–21.
- [9] Van Eerd W. Procrastination: Self-regulation in initiating aversive goals. *Appl Psychol* 2000;49(3):372–89.
- [10] Carver CS. Emergent integration in contemporary personality psychology. *J Res Pers* 1996;30(3):319–34.
- [11] Campion M, Medsker G, Higgs A. Relations between work team characteristics and effectiveness: Implications for designing effective work groups. *Pers Psychol* 1993;46(4):823–50.
- [12] Rissler A. Extended periods of challenging demands in high tech work. Consequences for efficiency, quality of life and health. In: Bradley GE, Hendrick HW, editors. *Human factors in organizational design and management – IV*. Amsterdam: Elsevier; 1994. p. 727–32.
- [13] Karasek R, Theorell T. *Healthy work*. New York: Basic Books; 1990.
- [14] Kirkman BL, Rosen B. Beyond self-management: Antecedents and consequences of team empowerment. *Acad Manage J* 1999;42(1):58–74.
- [15] Wageman R. Critical success factors for creating superb self-managing teams. *Organ Dev* 1997;26(1):49–61.
- [16] Locke EA, Shaw KN, Saari LM, Latham GP. Goal setting and task performance: 1969–1981. *Psychol Bull* 1981;90(1):125–52.
- [17] Turner JR, Cochrane RA. Goals-and-methods matrix: coping with projects with ill defined goals and/or methods of achieving them. *Int J Manage* 1993;11(2):93–102.
- [18] Locke EA, Latham GP. *A theory of goal setting and task performance*. Englewood Cliffs, NJ: Prentice-Hall; 1990.
- [19] Hackman JR, editor. *Groups that work (and those that don't)*. San Francisco: Jossey-Bass; 1990.
- [20] Pinto MB, Pinto JK, Prescott JE. Antecedents and consequences of project team cross-planning in R&D settings. *IEEE Trans Eng Manage* 1993;33:134–40.
- [21] Albanese R, Van Fleet D. Rational behavior in groups: The free-riding tendency. *Acad Manage Rev* 1985;10(2):244–55.
- [22] Hackman JR, Wageman R, Ruddy TM, Ray CL. Team effectiveness in theory and practice. Linking theory with practice. In: Cooper CL, Locke EA, editors. *Industrial and organizational psychology*. USA: Blackwell; 2000. p. 110–29.
- [23] Beehr TA, Jex SM, Stacy BA, Beth A, Murray MA. Work stressors and coworker support as predictors of individual strain and job performance. *J Organ Behav* 2000;21(4):391–405.
- [24] Guzzo RA, Yost PR, Cambell RJ, Shea GP. Potency in groups: Articulating a construct. *Br J Social Psychol* 1993;32(1):87–106.
- [25] Campion M, Papper E, Medsker G. Relations between work team characteristics and effectiveness: a replication and extension. *Pers Psychol* 1996;49(2):429–52.
- [26] Sundstrom E, DeMeuse KP, Futrell D. Work teams: Applications and effectiveness. *Am Psychol* 1990;45(2):120–33.
- [27] Guzzo RA, Dickson MW. Teams in organizations: Recent research on performance and effectiveness. *Annu Rev Psychol* 1996;47:309–38.
- [28] Weingart L. Impact of group goals, task component complexity, effort, and planning on group performance. *J Appl Psychol* 1992;77(5):682–93.
- [29] Hovmark S, Nordqvist S. Project organization: Change in the work atmosphere for engineers. *Int J Ind Ergon* 1996;17(5):389–98.
- [30] Hovmark S, Thomsson H. ASK - ett frågeformulär för att mäta arbetsbelastning, socialt stöd, kontroll och kompetens i arbetslivet, (ASK – a questionnaire for measuring workload, social support, control and competence in work life). Report no 86. Department of Psychology, Stockholm University, Sweden; 1995.
- [31] Hellgren J, Sjöberg A, Sverke M. Intention to quiet: Effects of job satisfaction and job perceptions. In: Avallone F, Arnold J, de Witte K, editors. *Feelings work in Europe*. Milano: Guerini; 1997. p. 415–23.
- [32] Cohen SG, Ledford Jr GE, Spreitzer GM. A predictive model of self-managing work team effectiveness. *Hum Relat* 1996;49(5):643–76.